A2

4. (Amended) The cap of claim 2 wherein the thermoplastic first resin is light-transmitting.

17. (New) The cap of claim 9 wherein the indicia is printed in negative-image.

A3

18. (New) The cap of claim 1 further comprising a shaft rigidly attached to a back surface of the face portion, to engage a mechanical switch.

REMARKS

Applicants appreciate the care and attention the Examiner provided to the application. With respect to the restriction election, applicants acknowledge the election to prosecute the Claims 1 through 9, specifically reserving the right to further prosecute the remaining claims.

Given the election, applicants agree that the title originally given to the application does not reflect the claimed invention. Applicants believe that the amendment offered to the title removing reference to the method of manufacture originally embodied in the application, now accurately reflects the application after election.

In paragraphs 3 and 4 of the first office action, the Examiner rejected Claim 1 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent Number 4,181,829 to Nopper, et al. While applicants agree with the Examiner's assessment that Nopper discloses a "top member (110), surrounded by an outer portion that extends downward (112) . . . .", applicants disagree that Nopper et al. discloses a skirt portion as claimed by applicants in their Claim 1. As can be seen from the patent of Nopper et al., that patent discloses a top member (110) integral with the *key* (112). Rather than describing a skirt with an unfettered hem, the key of Nopper et al. is integral with key extensions (124, 126). Without benefit of the hem, the key of Nopper et al. makes direct contact with switch membrane (130). This discussion is not gratuitous.

The presence of an unfettered hem allows residual light not transmitted through the face member to escape out around the bottom of the keycap, further illuminating the board. Thus, the first distinction between the reference to Nopper et al. and the invention of the applicants is the presence of the hem.

Secondly, the keys discussed and illustrated by Nopper et al. in claiming their post-curing vulcanization process, are rubber keys for low or micro-travel applications. Thermoplastic, full-travel keys and rubber, low or micro-travel keys are manufactured differently and have different functioning; they are not analogous art with respect to each other.

These keys of Nopper et al. are described in the industry as of the dome variety and are usually found in a continuous membrane. It is for this latter reason that such keys are made of rubber (as described by Nopper et al.), and specifically for durability purposes, of silicon rubber. These rubber keys are well-known in the industry in keypad applications such as with cellular telephones, calculators, household remote-control devices, machinery switches, etc. Within this well-know industry segment, Nopper et al. teach a vulcanization process limited to rubbers which creates a better rubber-to-rubber bond through post-curing.

The term "travel" is well-known and well-used in the industry to refer to the distance a switch is depressed in order to provide engagement. In standard data-entry keyboards, this is a roughly vertical measurement. The industry standard for the definition of "full-travel" is from the Deutches Industrie Norm (DIN). The DIN definition of full travel is 3.8mm ± 10%. While there are no industry standards for either "low-travel" or "micro-travel", industry practice is that the former covers travel less than 2mm while the latter is less than 1mm, and more typically, less than .30 mm. Because of the overall distance of travel, full-travel keys allow for over-travel. Full-travel keys are designed to engage the switch at approximately 1.9mm, but allow for travel past the switch point without further affecting the switch response. This over-travel is part of an operator feedback system to signal that the switch has been properly deployed. This feedback is alternatively called in the industry "positive feel"or "tactile feedback". Mechanical full-travel switches can also provide audible feedback to the operator. This audible feedback of the mechanical full-travel switches is the familiar "clack" of a word-processing QWERTY-style keyboard.

Positive feel and feedback are the main reasons that alpha-numeric data entry into word-employing computers is almost exclusively performed through full-travel switches. Micro-travel, low-travel, and no-travel switches are not conducive to alpha-numeric data entry into word-employing computers (*e.g.*, for word processing or information retrieval) due to the absence of this feedback.

Figures 5 and 6 of Applicants' application illustrate mechanical full-travel switches. With a mechanical full-travel key, the mounting post, such as illustrated as element 20 in

Figure 5 must be rigid. Rigidity is necessary in the first instance to deploy the mechanical switch. Rigidity is also necessary, to provide deployment when a key is struck off center. If a central column such as illustrated as element 20, was made of rubber, striking the key on its upper surface off center will result in flection of the post, with non-deployment as a possible result.

Rubber has not been found useful in mechanical full-travel applications; sufficient rigidity is available only through the thermoplastics.

As mentioned above, it is clear that Nopper et al. is directed toward a union of two rubber components. The usefulness of the Nopper et al. invention to rubber composites is highlighted initially by its title "Integrally Molded Composites of Silicone Rubber". Such usefulness to the rubber components is discussed in the background section at Column 1, lines 47-53, "In the case of forming elastomers, such as silicone rubbers into a composite product, it would have been expected the placement of a preformed insert, which is only partially cured into a mold and flowing a moldable material there against would improve the bond strength between the preformed elastomers and the flowable material." In the objects, (column 2, lines 25-27): "It is a further object of the invention to produce composite products by vulcanizing a flowable material of one color onto a preform of different color." In the detailed description at Column 3, lines 42 through Column 4 at line 2,

> This preformed light-pipe 10 is preferably formed of an elastomer such as silicone rubber. Silicon rubber is a well known material, per se, and is known for its anti-stick properties. Silicon rubber has thus been used for taking impressions of patterns or models, and is used as a mold or mold lining because it adheres to neither the patterns or molded parts. The present inventors have found that a commercially available silicone rubber sold by the Dow-Corning Corporation under the tradename Silastic 595 silicone rubber in the form of a gum can be separately formed by molding techniques such as injection or transfer molding.
>
> The transparent silicone rubber, compounded with a minor amount of a filler, such as fumed silica, to render it translucent, can be introduced into a heated light-pipe mold (not shown), and maintained at an elevated temperature, such as 320°C. The molded silicon rubber gum can be formed and partially cured (mold cured) within a period of 60-75 seconds whereupon it is ejected from the mold as a light-pipe preform. These preformed and

partially cured light-pipes 10 are thereafter post-cured out of the mold for about 4 hours at about 200°C. The present inventors have surprisingly discovered that the post-curing step imparts significantly greater propensity of the preformed light-pipes 10 to bond or vulcanize to the subsequently molded material of the composite. This result is surprising in view of the fact that the preferred subsequently molded material is also silicone rubber.

The use of silicone rubber is further identified in the detailed description by Nopper et al.:

A preferred silicone rubber key forming material 12 is the same Silastic 595 silicone rubber identified in connection with the preformed light-pipe 10 except that it contains a filler or pigment so as to render it opaque to the passage of light. Suitable fillers and pigments are known to those skilled in the art, such as silica or TiO_2. The point of introduction of the flowable key forming silicone rubber material 12 is selected so as to minimize displacement of the preformed light-pipe 10 or 10' as well as to locate the sprue in a location where it does not detract from the functioning or appearance of key 112. It has been found preferable to inject the flowable material from a location such that it enters in the vicinity of rubber key extension 26 through the mold cavity, flowing about rubber light-pipe 10 and exiting through rubber key extension 24 as shown in Figure 4. However for different configurations of mold cavity and preformed translucent or transparent elements the location of the injection site will be chosen so as to minimize displacement of the preformed translucent or transparent elements. It should also be borne in mind that the terms height, width, and length are relative and may be used interchangeably for purposes of the present specification and claims. It is only important that at least one dimension X or X' of the preformed light-pipe 10 or 10' exceed the dimension Y or Y' of the closed mold cavity.

The present inventors are surprised that post-curing of the preformed silicone rubber improves bonding of the preform to the flowable opaque silicone rubber material. By post-curing the silicone rubber preform the present inventors think that there is no 'out-gassing' from the preform which would interfere with the bond of the flowable silicone rubber. If a partially

cured preform is utilized in the present process the bonding of the preform to the flowable material is noticeably reduced as compared to the use of a post-cured preformed silicone rubber light-pipe 10.

As stated above, applicants believe that as Nopper et al. fails to disclose a skirt, it does not anticipate the invention of the applicants. To further distinguish themselves from the Nopper et al. reference, however, applicants have amended Claim 1 to include the restriction from the former Claim 2 to require a rigid face portion be molded from a thermoplastic resin.

Not only is the use of rigid thermoplastics dictated by the full-travel switch, but it is also of benefit to the sublimation printing process taught by Applicants. Sublimation printing on thermoplastic as taught by Applicants requires the application of heat for 30 - 45 seconds. The result is a crisp indicia. While sublimation printing can occur on rubber surfaces, due to the necessity of lower heat tolerance, the process takes between 3 and 5 minutes to accomplish the same level of bonding. Moreover, the sublimation ink under the prolonged conditions on the rubber surface will undergo minor migration resulting in a less crisp indicia.

In paragraphs 5 and 6 of the office action, the Examiner rejected Claims 2-6 pursuant to 35 U.S.C. § 103(a) as being obvious in light of the patent in Nopper et al. As part of the rejection, the Examiner points to use by the applicants of the phrase "thermoplastic molding is well known in the industry" as part of its rejection. By use of that phrase, applicants were intending to convey that thermoplastic molding, and injection molding in particular, to create a single transparent or translucent element is well known in the industry. There can be no interpretation of that phrase to suggest that a two-shot molding process for thermoplastic resin to create a transparent top of a keycap was well known or even anticipated by the industry. Such is clearly not the case.

As indicated, Nopper et al. teach a vulcanized bond between rubber components. Nopper et al. specifically teach away from a mechanical joint. For instance, Nopper et al. state: "the prior art has also resorted to the use of mechanical means, such as projections . . . ." (Col 2, lines 3 - 4). Nopper et al. go on to state: "Thus the prior art attempts to make composite products have not proved to be entirely successful." The finding of Nopper et al. is wholly different from that of Applicants. Applicants teach mechanical joining through illustration of locking element 18 and element interlocking 32. It will be noted in this regard that in teaching the mechanical bond as the primary mechanism for joining its thermoplastic components, Applicants are not abandoning the fortuitous results of enhancement of the mechanical joint by some thermal bonding when the method claimed by the Applicants in

their non-elected claims is used.

Thus, Applicants have further distinguished themselves from the references of the Examiner through the rewritten Claim 2. The rewritten claim provides the clarification of the mechanical bond, away from which Nopper et al. teach.

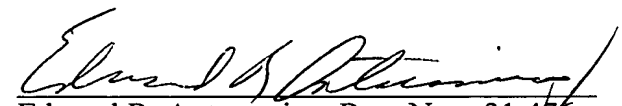
Although the references have been distinguished by the amendments offered, Applicants will nonetheless express their disagreement that the sweeping statement of Coulon et al. cited ("silkscreened, printed, or applied by a number of other techniques known in the art . . . ."), necessarily anticipates sublimation. The processes listed by Coulon et al. refer to surface treatments. Coulon et al. implicitly acknowledge this surface treatment by alternatively offering indicia molding options "so repeated use is less likely to wear the letters and characters away." (Col. 4, lines 32 - 33). The process of sublimation bonding into the plastic through the application of heat would not necessarily be understood from the sweeping statements of the prior art.

CONCLUSION

Applicants believe that the foregoing amendments favorably resolve the issues raised under 35 U.S.C. §§ 102 and 103(a) and place the claims of the application in condition for allowance. The Examiner is invited to call the undersigned attorney if that would be helpful in resolving any question which might remain.

Respectfully submitted,

Jansson, Shupe & Munger, Ltd.



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Marked up version

1. (Amended) A cap for a switch comprising:

- a rigid face portion formed of a [first synthetic] thermoplastic first resin having a continuous top surface, a perimeter, and edges; and
- a skirt portion formed of a [second] synthetic second resin integral with the edges of the face portion and extending downward from the face portion,

whereby, the integrated face portion and skirt portion define a substantially concave interior.

2. (Rewritten) The cap of claim 1 wherein the face portion is mechanically joined to the skirt portion.

4. (Amended) The cap of claim 2 wherein the thermoplastic first resin is light-transmitting.

17. (New) The cap of claim 9 wherein the indicia is printed in negative-image.

18. (New) The cap of claim 1 further comprising a shaft rigidly attached to a back surface of the face portion, to engage a mechanical switch.